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OIPE JAN 2 8 2008 PATENT & TRADEMARK OFFICE

PATENT APPLICATION

ATTORNEY DOCKET NO. 200309194-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Gadiel Seroussi

Confirmation No.: 5596

Application No.: 10/807,701

Examiner: Saif A. Alhija

Filing Date: March 23, 2004

Group Art Unit: 2128

Title: SEQUENCE SIMULATOR

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on November 27, 2007.

☒ The fee for filing this Appeal Brief is $510.00 (37 CFR 41.20).

☐ No Additional Fee Required.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d)) for the total number of months checked below:

☐ 1st Month $120 ☐ 2nd Month $460 ☐ 3rd Month $1050 ☐ 4th Month $1640

☐ The extension fee has already been filed in this application.

☒ (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account 08-2025 the sum of $ 510. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees.

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Respectfully submitted,

Gadiel Seroussi

By David Millers

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant:	Gadiel Seroussi		
Assignee:	Hewlett-Packard Development Company, L.P.		
Title:	SEQUENCE SIMULATOR		
Serial No.:	10/807,701	Filing Date:	March 23, 2004
Examiner:	Saif A. Alhija	Group Art Unit:	2128
Docket No.:	200309194-1		

Placerville, California
January 28, 2008

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COMMISSIONER FOR PATENTS
P.O. Box 1450
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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Dear Sir:

Appellant submits this Appeal Brief pursuant to the Notice of Appeal filed in this case and mailed November 27, 2007.

I. REAL PARTY IN INTEREST

The real party in interest is the assignee, Hewlett-Packard Development Company, L.P., as named in the caption above.

II. RELATED APPEALS AND INTERFERENCES

Based on information and belief, there are no prior or pending appeals, interferences or judicial proceedings known to appellant, the appellant's legal representative, or assignee which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Claims 1-12 and 17-26 are pending in the application. Claims 13-16 were canceled during prosecution of the application.

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Claims 1-12 and 17-20 stand rejected. Claim 2 was also objected to. Claims 21-26 were withdrawn from consideration as being drawn to non-elected inventions.

The rejections of claims 1-12 and 17-20 and the objection to claim 2 are being appealed. Claims 21-26 are not being appealed.

IV. STATUS OF AMENDMENTS

There are no unentered amendments in the application. A response to the Final Office Action was submitted on November 27, 2007 with a Notice of Appeal, but the after-final Response did not amend the claims. Pending Claims 1-12 and 17-20 appear in an Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention relates to simulating sequences. In particular, a simulated sequence can be generated that is not identical to an original sequence but does have the same statistical properties as the original sequence. The simulated sequence can then be used in place of the original sequence. Simulated sequences are particularly useful in testing systems such as error correction systems when an available original sequence or a signal associated with the original sequence does not provide enough data for adequate testing. (See paragraph **[0002]** of the specification.) The simulated sequences are also useful in generating texture that provides the same appearance in an image as a sample texture, while avoiding the undesirable image artifacts associated with using the sample texture repeatedly in an image. (See paragraph **[0003]** of the specification.)

Independent claim 1 is directed to a computer program product for simulating an input sequence, where the product is embodied on a computer-readable medium. Such products are described in paragraph **[0025]** of the specification. Claim 1 further recites code that, when executed, causes a computer to perform the following steps. The step of "partitioning the input sequence into a partition including a set of substrings and a tail, wherein the substrings have lengths that are not all equal" is illustrated in Fig. 3 as step 305. Paragraph **[0026]** describes partitioning where the substrings have different lengths. Claim 1 further recites the step of "outputting the substrings in a random order to generate an output sequence simulating the input sequence." Fig. 3 steps 320 to 355 illustrate a process for generation of a simulated sequence using a randomized "walking-the-tree" method. The illustrated process is described in paragraphs **[0028]** to **[0033]** of the specification.

Independent claim 17 is also directed to a computer program product for generating a

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simulated sequence, the product including code that, when executed, causes a computer to perform the recited steps (a) to (e). Step (a) is "creating a tree structure having nodes that correspond to substrings resulting from parsing an input sequence, wherein all of the nodes except a root node are initially designated as being unused." Fig. 2 illustrates an example of a tree structure for a simple sequence. Step 310 in Fig. 3 corresponds to an embodiment of constructing a tree structure, and paragraph **[0027]** of the specification describes embodiments of constructing a tree structure. Step (b) is "setting a current node equal to the root node," which is illustrated as step 320 of Fig. 3 and described in the second sentence of paragraph **[0028]**. Step (c) is "in response to the current node being unused, outputting a substring corresponding to the current node as part of the simulated sequence, designating the current node as being used, and setting the current node equal to the root node," which is illustrated by steps 330 and 335 of Fig. 3 and is described in the first sentence of paragraph **[0031]**. Step (d) is "in response to current node being used, selecting a branch from the current node to one of the nodes in a higher level of the tree structure and setting the current node to the node at an upper end of the selected branch," which is illustrated in Fig. 3 by steps 335 and 325 and described in the specification in the last two sentences of paragraph **[0031]**. Step (e) is "repeating (c) and (d) until all of the nodes are used," which is illustrated by the operation of step 350 in Fig. 3 and described in paragraph **[0033]** of the specification.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following issues are presented to the Board of Appeals for decision:

A. Whether Claims 1-10 and 17-20 are anticipated under 35 U.S.C. 102(b) by S.A. Savari, "Renewal Theory and Source Coding," Proceedings of the IEEE 88(11), pp 1692-1702, (2000), herein after Savari.

B. Whether Claim 11 is unpatentable under 35 U.S.C. 103(a) over Savari in view of F. Sakarya, D. Wei, and S. Emek, "An Evaluation of SAR Image Compression Techniques," 1997 IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP'97) - Volume 4, p. 2833, hereinafter Sakarya.

C. Whether Claim 12 is unpatentable under 35 U.S.C. 103(a) over Savari in view of El-Maleh et al., "A Geometric Primitives Based Compression Scheme for Testing

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Systems on a Chip," IEEE (2001), herein after El-Maleh.

D. Whether the objection to Claim 2 for failing to depend from a preceding claim is proper.

VII. ARGUMENT

A. Claims 1-10 and 17-20 are patentable under 35 U.S.C. 102(b) over Savari.

Independent claim 1 distinguishes over Savari at least by reciting, "outputting the substrings in a random order to generate an output sequence simulating the input sequence."

Savari is directed to source coding and describes how renewal theory can be applied to evaluate the performance of source coding and to optimize source coding. Savari, page 1695, the third paragraph on the right hand side of page 1695, which the Final Office Action refers to in the rejection of claim 1, discusses known universal source codes such as Lempel-Ziv (LZ) codes and Lempel-Ziv-Welch (LZW) codes. The coding processes that produce LZ or LZW codes compress input data by replacing variable length substrings with codes that are indices identifying the substrings in a dictionary. The output produced by these coding techniques does not include substrings in a random order because the codes are in an order defined by the input data that is encoded. Further, the codes do not simulate the input data because substrings are replaced by codes/indices, and the inserted codes/indices do not by themselves reflect the content of the substrings. Savari fails to disclose or suggest the problem of or need for simulating a sequence.

Looking further at paragraph 3 on the right column on page 1695, Savari states, "One way to assess the performance of a universal source code is to study how well it compresses a random output from a known probabilistic source." "Probabilistic" here refers to the source of data input for the coding/compression process, but Savari does not suggest outputting substrings in a probabilistic or random order to generate a simulated sequence. Savari then refers to specific universal source coding algorithms, and beginning in the 14th line of the cited paragraph, Savari states, "The encoder for each of these algorithms parses the source output into a concatenation of phrases and uses the binary code symbols to construct a uniquely decipherable representation of the phrases." Savari thus explicitly describes

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assigning codes to phases or substrings parsed from a sequence being encoded, not outputting those substrings in sequential or random order.

In accordance with an aspect of the present invention, an original sequence can be simulated to generate additional data that can be used as described in Appellant's specification for texturing of objects in generated images or for testing of systems when the original sequence does not provide a sufficient quantity of data for the desired tests. For such purposes, the simulated sequence preferably differs from the original sequence but has statistical characteristic similar to the original sequence. Savari is directed to different problems associated with lossless encoding or compression, and because Savari is directed to different problems, Savari fails to suggest randomness in an output signal or sequence relative to an input signal or sequence and fails to suggest producing a simulated sequence.

For the above reasons, independent claim 1 is patentable over Savari and the rejection of claim 1 should be reversed.

Claims 2-10 depend from claim 1 and are patentable over Savari for at least the same reasons that claim 1 is patentable over Savari.

The rejection of claim 17, which spans pages 8 and 9 of the Final Office Action, refers to the left hand column of page 1698 in Savari. In that column, Savari describes types of dictionaries used in universal coding and particularly describes universally parsable dictionaries. Beginning in line 23 in the left column on page 1698, Savari states "It is often convenient to picture the entries of a dictionary as the leaves of a rooted tree in which the root node corresponds to the null string, each edge is a source alphabet symbol, and each dictionary entry corresponds to the path from the root to a leaf." The three step process set forth near the bottom of that column in Savari is the Tunstall algorithm for generating a uniquely parsable dictionary. Savari further describes the relation of an expected number L_M of source letters per dictionary string to probabilities associated with nodes/substrings appearing in source data. Step (a) of claim 17 could employ the Tunstall algorithm to generate a tree structure as described by Savari. However, Savari describes and uses the tree structure for coding and <u>not</u> for generation of a simulated sequence. The assertions on pages 8 and 9 of the Final Office Action that Savari teaches the other steps recited in claim 17 lack references to specific portions of Savari and are unfounded.

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Independent claim 17 particularly distinguishes over Savari by reciting, "(c) in response to the current node being unused, outputting a substring corresponding to the current node as part of the simulated sequence, designating the current node as being used, and setting

the current node equal to the root node; (d) in response to current node being used, selecting a branch from the current node to one of the nodes in a higher level of the tree structure and setting the current node to the node at an upper end of the selected branch." Savari nowhere suggests outputting a substring and designating a current node as being used. As noted above, Savari discloses coding or compression of input sequences and therefore outputs codes in place of substrings. In particular, during encoding, codes (not substrings) are output. During decoding, when substrings are output, Savari fails to suggest using the concept of used or unused nodes. In particular, a decoding process can decode each code any number of times and the concept of used or unused nodes is irrelevant.

Independent claim 17 is thus patentable over Savari, and the rejection of claim 17 should be withdrawn.

Claims 18-20 depend from claim 17 and are patentable over Savari for at least the same reasons that claim 17 is patentable over Savari.

B. Claim 11 is patentable under 35 U.S.C. 103(a) over Savari in view of Sakarya.

Claim 11 depends from claim 1, which is patentable for at least the reasons given above. Sakarya is directed to evaluation of image compression techniques and is cited in the Final Office Action for disclosing application of compression to images. However, the combination of Savari and Sakarya is still directed to encoding or compression, not generating a simulated sequence. Accordingly, the above reasoning showing that claim 1 is patentable over Savari also applies to the combination of Savari and Sakarya, and therefore claims 1 and 11 are patentable over the combination of Savari and Sakarya.

C. Claim 12 is patentable under 35 U.S.C. 103(a) over Savari in view of El-Maleh.

Claim 12 depends from claim 1, which is patentable over Savari for at least the reasons given above. El-Maleh is directed to methods for compressing test data used, for example, in built-in self-tests in integrated circuits, and El-Maleh is cited in the Office Action for disclosing the combination of on-chip testing and compression. However, the combination of Savari and El-Maleh as suggested by the Examiner is still directed to encoding or compression, not generating a simulated sequence. Accordingly, the above

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reasons that claim 1 is patentable over Savari also apply to the combination of Savari and El-Maleh, and claims 1 and 12 are patentable over the combination of Savari and El-Maleh.

D. The objection to claim 2 should be withdrawn.

The Final Office Action at the bottom of page 4 contains an objection to claim 2 for failing to depend from a preceding claim. Appellant responded to the objection to claim 2 in the Response filed November 27, 2007. The Advisory Action dated January 10, 2008 did not indicate that claim 2 was still objected to but also did not indicate that the objection to claim 2 was withdrawn. Appellant provides the following arguments for consideration in the event that the objection to claim 2 is still being maintained.

Claim 2 was amended to depend from claim 3 in the Appellant's Response to Office Action filed April 26, 2007. The Final Office Action contains an objection to claim 2 as not referring to a preceding claim, and the objection refers to MPEP 608.01(n). MPEP 608.01(n) cites 37 C.F.R. 1.75(c), which refers to claims submitted with the specification. However, claims amended during prosecution are permitted to depend from subsequent claims. MPEP 608.01(n) specifically states, "During prosecution, the order of claims may change and be in conflict with the requirement that dependent claims refer to a preceding claim. Accordingly, the numbering of dependent claims and the numbers of preceding claims referred to in dependent claims should be carefully checked when claims are renumbered upon allowance." (See the fourth from last paragraph of MPEP 608.01(n).) The dependence of claim 2 on claim 3 is thus permitted, and Appellant requests withdrawal of the objection to claim 2.

For the above reasons, Appellants respectfully submit that pending Claims 1-12 and 17-20 are allowable. Accordingly, Appellants submit the above-described rejections and objections are unfounded and therefore should be reversed.

Please contact the undersigned attorney at (530) 621-4545 if there are any questions concerning this Appeal Brief or the application generally.

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Respectfully submitted,

David Millers

David Millers
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VIII. CLAIMS APPENDIX

Claims 1-12 and 17-20, which are the claims involved in this appeal, are copied below.

1. (Previously Presented) A computer program product for simulating an input sequence, the product being embodied on a computer-readable medium and comprising code that, when executed, causes a computer to perform the following:

partitioning the input sequence into a partition including a set of substrings and a tail, wherein the substrings have lengths that are not all equal; and

outputting the substrings in a random order to generate an output sequence simulating the input sequence.

2. (Previously Presented) The product of claim 3, wherein the tail is selected from the group consisting of an empty string and the substrings of the partition.

3. (Previously Presented) The product of claim 1, wherein partitioning the input sequence comprises selecting each of the substrings to consist of one or more consecutive symbols from the input sequence, where each of the substrings differs from the other substrings of the partition.

4. (Previously Presented) The product of claim 1, wherein for each substring, the substring is a shortest sub-sequence of consecutive symbols from the input sequence such that the substring differs from all of the substrings that are in the partition and preceding in the input sequence.

5. (Previously Presented) The product of claim 4, wherein the code, when executed, further causes the computer to perform the following:

drawing a random integer from a range of $|T_X|$ integers, where $|T_X|$ is the number of sequences in a set T_X such that for each sequence in the set T_X, a partition of the sequence into substrings such that each substring is a shortest sub-sequence of symbols from the sequence that differs from all of the substrings of the partition that are preceding in the sequence includes a set of substrings that is equal to the set of the substrings in the partition of the input sequence; and

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mapping the random integer to a corresponding one of the sequences in the set T_X, wherein the sequence corresponding to the random integer defines the random order for outputting the substrings.

6. (Previously Presented) The product of claim 1, wherein outputting the substrings comprises:

organizing the substrings in a tree having multiple levels, wherein each of the levels contains substrings of equal length, and branches between any two of the levels connect each substring in a higher of the two levels to a substring that results from deleting a last symbol of the substring;

designating the substrings in the partition as available;

selecting one of the substrings as a current substring;

randomly selecting one of the branches from the current substring to the substrings in a higher one of the levels of the tree, wherein each of the branches from the current substring has a probability of being taken that depends on how many available uses there are of the substrings that are connected through the branch to the current substring;

changing the current substring to the substring at an end of the branch selected;

in response to the current substring not being available, repeating selection of one of the branches from the current substring and changing the current substring to the substring at the end of the branch selected; otherwise

outputting the current substring; and

marking the current substring as used.

7. (Previously Presented) The product of claim 6, wherein selecting one of the substrings as the current substring comprises selecting an empty string as the current substring.

8. (Previously Presented) The product of claim 6, wherein marking the current substring as used changes the string from being available to being unavailable.

9. (Previously Presented) The product of claim 6, wherein marking the current substring as used reduces available uses of the current substring.

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10. (Previously Presented) The product of claim 6, wherein the probability of each of the branches being taken is equal to a ratio of a total of the available uses of the substrings that are connected through the branch to the current substring and a total of available uses of the substrings that are connected through all of the branches connecting the current substring to higher levels in the tree.

11. (Previously Presented) The product of claim 1, wherein the code, when executed, further causes the computer to perform the following:

generating the input sequence from an ordering of pixel values in a digital representation of a texture; and

generating a digital representation of a simulation of the texture from the output sequence.

12. (Previously Presented) The product of claim 1, wherein the code, when executed, further causes the computer to perform the following:

generating the input sequence from measurements of a first system; and

using the output sequence for testing of a second system.

13. (Canceled)

14. (Canceled)

15. (Canceled)

16. (Canceled)

17. (Previously Presented) A computer program product for generating a simulated sequence, the product being embodied on a computer-readable medium and comprising code that, when executed, causes a computer to perform the following:

(a) creating a tree structure having nodes that correspond to substrings resulting from parsing an input sequence, wherein all of the nodes except a root node are initially designated as being unused;

(b) setting a current node equal to the root node;

(c) in response to the current node being unused, outputting a substring corresponding to the current node as part of the simulated sequence, designating the current node as being used, and setting the current node equal to the root node;

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(d) in response to current node being used, selecting a branch from the current node to one of the nodes in a higher level of the tree structure and setting the current node to the node at an upper end of the selected branch; and

(e) repeating (c) and (d) until all of the nodes are used.

18. (Previously Presented) The product of claim 17, wherein the substrings resulting from parsing the input sequence comprises the substrings from parsing the input sequence according to the Lempel-Ziv incremental parsing rule.

19. (Previously Presented) The product of claim 17, wherein the input sequence comprises a binary sequence, and selecting the branch from the current node comprises:

selecting a first branch from the current node if a second branch from the current node is blocked; and

selecting the second branch from the current node if the first branch from the current node is blocked.

20. (Previously Presented) The product of claim 17, wherein the input sequence comprises a binary sequence, and selecting the branch from the current node comprises selecting a branch Vb, wherein branch index b is a randomly drawn bit with a probability of being 1 equal to U(V1)/[U(V0)+U(V1)], U(V1) is a number of unused nodes on a branch V1 from the current node, and U(V0) is a number of unused nodes on a branch V0 from the current node.

21. (Previously Presented) A process comprising:

sampling a first image to extract pixel values representing a texture of a first object;

ordering of the pixel values to create an input sequence;

partitioning the input sequence into a partition including a set of substrings and a tail, wherein the substrings have lengths that are not all equal;

outputting the substrings in a random order to generate an output sequence; and

using the output sequence to create color variations of a texture of a second object that is in a second image.

22. (Previously Presented) The process of claim 21, wherein:

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the first image is an image of real objects; and

the second image is a computer generated image.

23. (Previously Presented) The process of claim 21, wherein partitioning the input sequence comprises selecting each of the substrings to consist of one or more consecutive symbols from the input sequence, where each of the substrings differs from the other substrings of the partition.

24. (Previously Presented) A process comprising:

generating an input sequence from a first signal from a first system; and

partitioning the input sequence into a partition including a set of substrings and a tail, wherein the substrings have lengths that are not all equal;

randomly ordering the substrings into an output sequence; and

testing a second system using a second signal that is derived from the output sequence, the second signal simulating the first signal.

25. (Previously Presented) The process of claim 24, wherein:

the first system comprises a communication channel;

the first signal contains errors; and

the second system comprises an error correction system intended to remove the errors.

26. (Previously Presented) The process of claim 24, wherein partitioning the input sequence comprises selecting each of the substrings to consist of one or more consecutive symbols from the input sequence, where each of the substrings differs from the other substrings of the partition.

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IX. EVIDENCE APPENDIX

No evidence is being relied on in this appeal.

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X. RELATED PROCEDINGS APPENDIX

To Appellant's knowledge, there are no proceedings related to this appeal.

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